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RESEARCH REPORT

# Soft-tissue Disorders of the Shoulder

## A study of inter-observer agreement between general practitioners and physiotherapists and an overview of physiotherapeutic treatment

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**Key Words**

Shoulder, diagnosis, physiotherapy, inter-observer agreement.

**Summary**

*Objective:* To study the inter-observer agreement between general practitioners (GPs) and physiotherapists in diagnosing soft-tissue shoulder disorders. In addition, to describe the physiotherapy for shoulder disorders in primary care.

*Methods:* 18 GPs recruited 349 consecutive patients with a new episode of shoulder pain for a follow-up study. Cohen's kappa for diagnostic agreement between GPs and physiotherapists was calculated for a subset of 120 patients who were referred for physiotherapy. The physiotherapists recorded the nature of the physiotherapeutic treatment on standardised forms.

*Results:* The overall kappa for the classification of shoulder disorders was 0.31 (95% confidence limits: 0.19, 0.42). Agreement was somewhat better in cases of capsular syndrome (0.48, 95%) confidence limits: 0.30, 0.66), but worse in cases of acute bursitis (– 0.03, 95% confidence limits: –0.21, 0.15). Agreement also appeared to be better in patients with a long symptom duration. The physiotherapists most frequently used deep friction massage, exercise therapy and passive mobilisations to treat shoulder pain. Nearly all cases of tendinitis were treated with deep friction massage (97%), whereas the majority of patients with a capsular syndrome were treated with exercise therapy (67%) and passive mobilisation (72%).

*Conclusions:* Inter-observer agreement between GPs and physiotherapists was rather low, considering the fact that diagnosis of shoulder pain often has implications for the selection of therapy. Future research should focus on the question of whether inter-observer agreement can be improved and whether different diagnostic categories do, indeed, require different therapeutic strategies.

## Introduction

Approximately 7 to 21% of the population in Western countries suffers from a painful or stiff shoulder (Bjelle, 1989; Bergenudd *et al,* 1988; Chard *et al*, 1991), but not all episodes are presented to the health care facilities. The annual incidence of shoulder disorders in general practice is estimated to be between 7 and 13 per 1,000 patients per year (Croft, 1993; Miedema, 1994; Van der Windt *et al*, 1995).

There are many conditions that may underlie shoulder pain, including arthrogenic, neurogenic, psychogenic, vascular and metabolic factors (Neviaser, 1983; Smith and Campbell, 1992; Uhthoff and Sarkar, 1990; Zuckerman *et al*, 1991a, b). As yet, there is no generally accepted explanation for the etiology and pathogenesis of the majority of cases with shoulder pain. Consequently, the interpretation of signs and symptoms is often difficult. A method for the identification of the putative site of the lesion, designed by James Cyriax, resulted in a renewed diagnostic classification of shoulder disorders and guidelines for treatment (Cyriax, 1981). Although this method may be very useful in clinical practice, it has received little further scrutiny. Pellecchia *et al* (1996) investigated inter-observer agreement of the Cyriax evaluation in 19 patients with shoulder pain. They reported a very high 'almost perfect' agreement using two trained, experienced physiotherapists for the evaluation of the shoulder pain.

Approximately 30% of all patients with a new episode of shoulder pain in Dutch primary care are referred for physiotherapy (Miedema, 1994), indicating that in many cases the treatment of shoulder patients is the joint effort of a physiotherapist and a general practitioner (GP). Assuming that a diagnostic classification of shoulder disorders has implications for subsequent treatment, it is important to evaluate whether GPs and physiotherapists agree on the diagnosis, whatever classification system is used, and to observe whether subsequent therapy is attuned to the diagnosed disorders. The quality of primary care of the shoulder patients may benefit from a consistent management by both GPs and physiotherapists.

In 1990, the Dutch College of General Practitioners issued clinical guidelines for the management of shoulder pain, based on the concepts of Cyriax (Bakker *et al*, 1990). We used the diagnostic classification recommended in these guidelines to evaluate inter-observer agreement between GPs and physiotherapists in the diagnosis of shoulder pain (table 1). In addition, the content of physiotherapy for specific shoulder disorders was described.

**Table 1: Summary of the clinical guidelines for the diagnosis of shoulder pain** (Dutch College of General Practitioners, Bakker et al, 1990)

| *Syndrome* | *Diagnostic criteria* |
|---|---|
| Capsular syndrome (capsulitis, arthrosis, frozen shoulder, etc) | Restriction of lateral rotation, abduction and medial rotation. Pain in C5 dermatome |
| Acute bursitis | Restriction of abduction. Severe pain in C5 dermatome. Acute onset, no evident preceding trauma |
| Acromioclavicular syndrome | Restriction of horizontal adduction. Pain in the area of the acromioclavicular joint and/or C4 dermatome |
| Subacromial syndrome<br>Rotator cuff tendinitis<br>Chronic bursitis<br>Rotator cuff tears | Painful arc during abduction. Pain in the C5 dermatome. No restriction in passive range of motion.<br>At least one positive resistance test:<br>Bursitis: variable/little pain, normal power<br>Tendinitis: pain, normal power<br>Cuff tears: little pain, loss of power |
| Others<br>Unclear clinical pictures<br>Extrinsic causes | |

## Methods

Eighteen GPs from 11 practices, representing a population of 35,150 patients, recorded all new cases of shoulder disorders during a period of one year (April 1993–April 1994). New cases were defined as patients who had not consulted their GP for the affected shoulder during the preceding 12 months. A more detailed description of the methods and results of this follow-up study can be found elsewhere (Van der Windt *et al*, 1995b, 1996). Inclusion criteria for participation in the follow-up study were informed consent; ability to complete written questionnaires; age 18 years or older; complaints according to the GP caused by soft-tissue disorders (no neurological or vascular disorders, neoplasms, referred pain from internal organs or systemic rheumatic conditions); no dislocations or fractures.

Data from patients who were referred to one of the six participating physiotherapy practices (13 physiotherapists) were used for the evaluation of inter-observer variation. Both GPs and physiotherapists classified the patients into five categories (table 1), according to diagnostic guidelines issued by the Dutch College of General Practitioners (Bakker *et al*, 1990). The majority of the participating GPs and physiotherapists were already familiar with the Cyriax method, and the study was preceded only by a two-hour training session, explaining the study procedures and briefly rehearsing the physical examination of the neck and shoulder joint. The aim of the study was to observe and evaluate the diagnosis and treatment of shoulder complaints by GPs and physiotherapists in routine daily practice, limiting the possibilities of blinding the physiotherapist for the diagnosis made by the GP. All physiotherapists were therefore explicitly asked to make an independent decision with respect to diagnosis whenever they were aware of the diagnosis made by the GP. The diagnosis made by the GP on the day of referral (or, if not available, during a previous consultation) was compared with the diagnosis made by the physiotherapist at the first consultation.

Cohen's kappa is the statistic of choice for the evaluation of concordance between two clinicians for nominal categories (Haas, 1991). Cohen's kappa reflects the proportion of agreement, adjusted for the proportion of agreement due to chance: kappa = $(P_o–P_e)/(1–P_e)$, where $P_o$ is the proportion of observed agreement between examiners and $P_e$ is the proportion of agreement expected due to chance alone. Kappa gives an indication of the strength of concordance: kappa is equal to 0 for purely chance agreement, and reaches a maximum value of 1 for total concordance. Landis and Koch (1977) have proposed guidelines for the interpretation of the strength of concordance reflected by kappa: < 0.00 'poor'; 0.00–0.20 'slight'; 0.21–0.40 'fair'; 0.41–0.60 'moderate'; 0.61–0.80 'substantial'; 0.81–1.00 'almost perfect'.

The percentage agreement and Cohen's kappa, including the corresponding 95% confidence limits, were calculated using the equations presented by Fleiss (1981). An overall (generalised) kappa was calculated for the classification of shoulder pain in five diagnostic categories (table 1), and dichotomous kappas were computed for each diagnostic category. The influence on kappa of a number of patient characteristics was evaluated, including age, severity of pain, time span between the diagnoses of GP and physiotherapist, and the time span between the first presentation of the complaints and the referral for physiotherapy.

The clinical guidelines issued by the Dutch College of General Practitioners include additional tentative guidelines for treatment, but both GPs and physiotherapists were free to select the treatment strategy they preferred, which was subsequently recorded on standardised forms.

## Results

A total of 349 patients were enrolled in the follow-up study, of whom 146 (42%) were referred for physiotherapy by the GPs: 105 at the first presentation, and an additional 41 at a later date during the year of follow-up. Of those 146 patients, 26

**Table 2: Sex, age, and disease characteristics of the 120 patients referred for physiotherapy**

| | *Median* | *IQR*[1] |
|---|---|---|
| Age (years) | 47 | 37-57 |
| Severity of pain during the day[2] | 8 | 7-9 |
| Severity of pain at night[2] | 7 | 4-9 |
| | *Number* | *Percent* |
| *Sex* | | |
| Males | 60 | 50 |
| Females | 60 | 50 |
| *Symptom duration at presentation*[3] | | |
| < 1 week | 14 | 12 |
| 1 week - 1 month | 36 | 31 |
| 1 month - 6 months | 44 | 37 |
| > 6 months | 23 | 20 |
| *Diagnosis*[4] | | |
| Capsular syndrome | 21 | 17 |
| Acute bursitis | 8 | 7 |
| Acromioclavicular syndrome | 7 | 6 |
| Subacromial syndrome[5] | 74 | 62 |
| Others | 10 | 8 |

[1] IQR = interquartile range (25th to 75th percentile).

[2] As recorded by patient at presentation on an 11-point ordinal scale (0-10).

[3] Three patients did not respond to this question.

[4] According to GP at first presentation of complaints.

[5] Subacromial syndrome: 56 cases of rotator cuff tendinitis (47% of all patients), 11 cases of chronic bursitis, and 7 cases of mixed clinical picture or rotator cuff tears.

were referred to physiotherapists not participating in the study, leaving 120 cases available for the evaluation of inter-observer agreement.

Table 2 presents a summary of demographic variables and patient characteristics of the subpopulation of 120. Numerical data on the total population of 349 can be found elsewhere (Van der Windt *et al*, 1995b). There were few differences between the total study population and the referred subpopulation with respect to age, gender, duration and severity of the symptoms at presentation. However, there was a marked difference with respect to the diagnosis as recorded by the GPs at first presentation. Some disorders were more frequently referred for physiotherapy than others, resulting in relatively many cases of tendinitis (47%) and relatively few cases of acute bursitis (7%) in the referred subpopulation of 120 patients.

Table 3 presents the contingency table used in the analysis of inter-observer agreement, showing the distribution of diagnoses on the day of referral according to the GP (or, if not available, during a previous consultation), and according to the physiotherapist at the first consultation.

The proportion of observed agreement ($P_o$), reflecting observer agreement between GP and physiotherapist for each individual patient, was 63%. Adjustment for the proportion of agreement due to chance ($P_e$) resulted in a kappa of 0.31 (95% confidence limits: 0.19, 0.42, table 4). The dichotomous kappas computed for the specific disorders varied from –0.34 to 0.48, being highest for capsular syndrome.

**Table 4: Diagnosis of shoulder pain: inter-observer agreement between general practitioner and physiotherapist**

| | *Agreement (%)* | *Kappa* | *95% confidence limits* | |
|---|---|---|---|---|
| Overall kappa | 63 | 0.31 | 0.19, | 0.42 |
| *Specific diagnostic categories:* | | | | |
| Capsular syndrome | 86 | 0.48 | 0.30, | 0.66 |
| Acute bursitis | 9 | –0.03 | –0.21, | 0.15 |
| Acromioculavicular syndrome | 93 | 0.36 | 0.18, | 0.54 |
| Subacromial syndrome | 69 | 0.33 | 0.15, | 0.50 |
| Unclear/extrinsic causes | 83 | 0.07 | –0.10, | 0.25 |

A few patient characteristics appeared to influence the kappa statistic. Observer agreement was higher when the time span between first presentation to the GP and the date of referral was longer than two weeks (0.33, *versus* 0.18 for < 2 weeks). The same applied to patients with a rela-

**Table 3: Contingency table for the classification of shoulder disorders by the general practitioner (GP) and the physiotherapist (PT) (n = 120)**

| *PT†* / *GP** | *Capsular syndrome* | *Acute bursitis* | *Acromio-clavicular syndrome* | *Subacromial syndrome* | *Others* | *Total* |
|---|---|---|---|---|---|---|
| Capsular syndrome | 11 | 1 | 1 | 6 | 2 | 21 |
| Acute bursitis | – | – | – | 4 | – | 4 |
| Acromioclavicular syndrome | 2 | – | 3 | 2 | 1 | 8 |
| Subacromial syndrome | 4 | 2 | 3 | 59 | 7 | 75 |
| Others | 1 | – | – | 9 | 2 | 12 |
| *Total* | 18 | 3 | 7 | 80 | 12 | 120 |

* Diagnosis by GP at time of referral, or, if not available, during a previous consultation.

† Diagnosis by physiotherapist at first consultation.

tively long duration of symptoms at presentation (≥ 1 month: 0.47, *versus* 0.10 for < 1 month). The overall kappa did not seem to be influenced by either age or the severity of complaints as recorded by the patient at presentation.

The content of the physiotherapy is presented in table 5. The median duration of physiotherapy was six weeks (interquartile range 4 to 9), consisting of 12 sessions (interquartile range 8 to 15). Deep friction massage, passive mobilisations, and exercise therapy were the interventions most frequently recorded. Almost all cases of rotator cuff tendinitis were treated with deep friction massage (97%), whereas the majority of patients with capsular syndrome received exercise therapy (67%) and passive mobilisations (72%).

**Table 5: Treatment of shoulder pain by physiotherapists (%)***

| *Intervention* | *All patients (n = 120)* | *Tendinitis (n = 60)* | *Capsular syndrome (n = 18)* |
|---|---|---|---|
| Exercise therapy | 56 | 48 | 67 |
| Passive mobilisations | 44 | 25 | 72 |
| Deep friction massage | 68 | 97 | 22 |
| Physical applications | 48 | 57 | 50 |
| Patient education | 33 | 37 | 17 |

*Total frequency may exceed 100%, as a patient may have been treated with more than one modality.

# Discussion

## Inter-observer Agreement

The diagnosis of shoulder pain is still subject to much confusion and lack of consensus. The method introduced by James Cyriax is only one of several proposals for the classification of shoulder pain and has been applauded, but also severely criticised (Matthews, 1981; Potter, 1987). We evaluated the inter-observer agreement of this diagnostic classification system in everyday clinical practice in Dutch primary care.

The results of our observational study of 120 patients showed an observed agreement of 63% and a kappa of 0.31. This is disappointingly low, particularly in view of the fact that the physiotherapists in our study were not blinded for the diagnosis of the GP, which may even have led to an overestimation of agreement. Several reasons may account for the poor inter-observer agreement in our study. We refrained from organising elaborate training sessions which might have optimised agreement, as we were interested in observer agreement in routine clinical practice. Furthermore, a visit to a GP probably takes less than ten minutes, whereas the median duration of a physiotherapy session was 30 minutes. The different in educational background between GPs and physiotherapists could also have contributed to the inter-observer variation (Kerssens and Curfs, 1993).

To our knowledge, only one other study on the inter-observer agreement of the Cyriax method for the assessment of shoulder pain has been conducted (Pellecchia *et al*, 1996). It reported almost perfect inter-observer agreement, with a kappa of 0.88. Trained and experienced physiotherapists examined the patients in random order and recorded test results and diagnoses under blinded conditions. It is unclear, however, whether the study population (21 painful shoulders in 19 patients) consisted of consecutive patients or was selected from a larger pool of shoulder patients. Moreover, it is not entirely clear whether the study was carried out in primary care or in a hospital setting. Little information was provided on patient characteristics, such as symptom duration and disease severity.

Our results indicate that the inter-observer agreement was better in patients with relatively long-standing complaints at presentation (> 1 month). The same was found for a relatively long time interval between first presentation and referral for physiotherapy. It might be argued that it is easier to interpret the signs and symptoms and to identify the site of the lesion in patients with persistent, chronic conditions.

Cohen's kappa is the statistic of choice for the evaluation of concordance between two clinicians for nominal categories, but it may be influenced by extraneous factors. The overall kappa is a summary measure and may hide the fact that one diagnostic category can account for a large part of the disagreement (Maclure and Willett, 1987). Table 4 shows that dichotomous kappas ranged between –0.03 for acute bursitis and 0.48 for capsular syndrome. The extremely low – in fact negative – kappa for acute bursitis can be explained by several factors that may influence the stability of kappa. First, kappa varies with the prevalence of the diagnosis under investigation, which was indeed very low in the case of acute bursitis (four out of 120) (Maclure and Willett, 1987). Furthermore, whenever the proportion of agreement due to chance ($P_e$) is large, kappa will be low (Feinstein and Cicchetti, 1990; Haas, 1991). This was indeed the case for acute bursitis ($P_e$ was 0.94). These drawbacks of the kappa statistic should make it evident that guidelines for the evaluation of the strength of agreement, such as the guidelines proposed by Landis and Koch (1977), can only be used with caution. Nevertheless, according to these guidelines the inter-observer agreement in our study (kappa = 0.31) can only be considered to be 'fair' agreement. Although we have demonstrated these results for the Cyriax method, they may just as well hold

for other diagnostic classification systems for shoulder disorders, which are primarily based on history taking and physical examination.

## Physiotherapy

Deep friction massage, exercise therapy and passive mobilisations were the most frequently applied physiotherapy modalities. As expected, management varied between the diagnostic categories; treatment of tendinitis predominantly consisted of deep friction massage, whereas most cases of capsular syndrome were treated with exercise and passive mobilisations. Groenewegen *et al* (1989) have also demonstrated that physiotherapists often adapt therapy to various aspects of their diagnosis, particularly to the localisation of the lesion, symptom duration, and functional impairment. Additional data from our observational study demonstrate that not only physiotherapists, but also GPs frequently base their management on the results of the diagnosis (Van der Windt *et al*, 1995b).

At present, there are no generally accepted guidelines for the treatment of shoulder pain (Nitz, 1986; Smith and Campbell, 1992). Shoulder disorders are believed to benefit from a wide variety of interventions, but the optimal treatment of shoulder disorders remains unclear. Systematic reviews of the literature show that there is still insufficient evidence for the efficacy of medication (Van der Windt *et al*, 1995a), physiotherapy (Van der Heijden *et al*, 1992) and steroid injections (Van der Heijden *et al*, 1996), suggesting that further studies are needed to evaluate the efficacy of most of the available interventions.

## Conclusions

Although inter-observer reliability according to the Cyriax method might be good under controlled conditions, in everyday clinical practice agreement between GPs and physiotherapists appears to be no more than fair (kappa = 0.31). Diagnosis seems to have implications for subsequent treatment, despite the fact that there is still insufficient evidence for the efficacy of the available interventions for shoulder pain. Therefore, future research should indicate whether inter-observer agreement can be improved and whether different diagnostic categories do, indeed, require different management strategies, particularly exercise therapy and passive mobilisations, which have only rarely been subjected to evaluation in randomised clinical trials, despite their frequent use for shoulder disorders. This dearth of evidence goes against the contemporary trend towards audit and outcome measurement. New methodologically sound trials on the efficacy of physiotherapy are needed.


### Authors

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### *Contribution*

Cynthia Liesdek carried out the analysis of data with respect to inter-observer variation, and is first author of the manuscript.

Daniëlle van der Windt designed the prospective follow-up study, was responsible for data collection and analysis, and is a co-author of the manuscript.

Bart Koes was project leader of the study, supervised the design and conduct of the prospective follow-up study, and contributed to revision of manuscript.

Lex Bouter initiated the prospective follow-up study, supervised the project leader, and contributed to revision of the manuscript.

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